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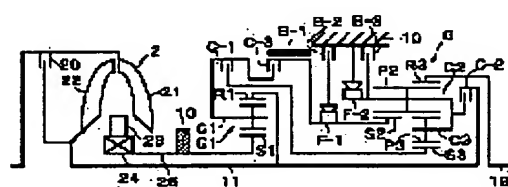
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(54) AUTOMATIC TRANSMISSION FOR VEHICLE

(57)Abstract:

PROBLEM TO BE SOLVED: To secure torque capacity of two clutches for inputting deceleration rotation by increasing diameters of the clutches to prevent enlarging of size and weight caused by increase of a shaft length, in an automatic transmission for a vehicle of a gear train accomplishing multiple stages.

SOLUTION: This automatic transmission includes a deceleration planetary gear G1, two clutches C-1, C-3 for transmitting its deceleration rotation, and a planetary gear set G having two elements S2, S3 into which the deceleration rotation through the clutches C-1, C-3 is inputted. The deceleration planetary gear G1 and the two clutches C-1, C-3 are disposed on one side of the planetary gear set G such that the clutch C-3 is located on the planetary gear set side to the clutch C-1. An input side member of the clutch C-1 is connected to an output element C1 of the deceleration planetary gear G1 and to an input side member of the clutch C-3, while an output side member of the clutch C-1 is connected to one of the two elements S2, S3 of the planetary gear set G through the inner circumference of the clutch C-3. Thereby, a member passing periphery sides of both the clutches C-1, C-3 is eliminated to increase diameters of both the clutches C-1, C-2.



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CLAIMS

[Claim(s)]

[Claim 1] Moderation planetary gear and two clutches which transmit the moderation rotation which passed through these moderation planetary gear at least, In the automatic transmission for cars which attains a multistage gear ratio with the planetary-gear set into which the moderation rotation which passed through these two clutches is inputted To the one side of said planetary-gear set, the 1st and 3rd clutches inputted into two elements with which planetary-gear sets differ, respectively the moderation rotation which passed through moderation planetary gear and these moderation planetary gear The 3rd clutch is made into a planetary-gear set side from the 1st clutch, and it is arranged. The input flank material of the 1st clutch It is the automatic transmission for cars characterized by having connected with the input flank material of the output element and the 3rd clutch of moderation planetary gear, and connecting the output side member of the 1st clutch with one side of said two elements of a planetary-gear set through the inner circumference of the 3rd clutch.

[Claim 2] While the 1st element is connected with the output side member of the 1st clutch and the 2nd element is connected with the output side member of the 3rd clutch, said planetary-gear set While connecting with the output side member of the 2nd clutch into which a stop in a change gear case is enabled by the 1st stop means, and the 3rd element inputs non-slowng down rotation The automatic transmission for cars according to claim 1 with which the stop in a change gear case was enabled by the 2nd stop means, and the 4th element was connected with the output member.

[Claim 3] Said moderation planetary gear are the automatic transmissions for cars according to claim 1 or 2 which had one element fixed by the boss section which carries out total material from a change gear case.

[Claim 4] It is the automatic transmission for cars according to claim 3 with which said change gear case has a support wall, the 1st clutch has been arranged on the boss section, and the 3rd clutch has been arranged near the support wall.

[Claim 5] Said 3rd clutch is the automatic transmission for cars according to claim 4 supported on the body prolonged in shaft orientations from a support wall.

[Claim 6] It is the automatic transmission for cars according to claim 4 or 5 with which said output member was used as counter gear, and these counter gear have been arranged to the 3rd clutch at the other side of a support wall.

[Claim 7] Said support wall is an automatic transmission for cars according to claim 6 which has the body which supports counter gear.

[Claim 8] It is the automatic transmission for cars according to claim 3 with which said change gear case has a support wall, the 1st clutch has been arranged at the one side of a support wall, and the 3rd clutch has been arranged at the other side.

[Claim 9] Said 1st and 3rd clutches are the automatic transmissions according to claim 8 supported on the body prolonged in shaft orientations from a support wall.

[Claim 10] The input flank material of said 1st clutch is an automatic transmission for cars according to claim 4, 5, 8, or 9 arranged towards the sense in which considers as the clutch drum which connotes a hydraulic servo, and the cylinder of a hydraulic servo carries out opening to a moderation planetary-gear side.

[Claim 11] The output side member of said 3rd clutch is the automatic transmission for cars according to claim 4, 5, 8, or 9 connected with one element of a planetary-gear set towards the sense in which considers as the clutch drum which connotes a hydraulic servo, and the cylinder of a hydraulic servo carries out opening to a support wall in an opposite direction.

[Claim 12] Said 1st stop means is the automatic transmission for cars according to claim 11 which consisted

of band brakes and was made into the engagement side of a band in the peripheral face of the clutch drum of the 3rd clutch.

[Claim 13] Said 2nd clutch is an automatic transmission for cars according to claim 2 arranged near the moderation planetary gear.

[Claim 14] It is the automatic transmission for cars according to claim 13 with which the input flank material of said 2nd clutch was used as the clutch drum, and this clutch drum was used as the input member to moderation planetary gear.

[Claim 15] It is the automatic transmission for cars according to claim 13 with which the output side member of said 2nd clutch was used as the clutch drum, and this clutch drum was connected with the 3rd element of a planetary-gear set through the intermediate shaft.

[Claim 16] The friction member which connects said the 2nd input flank material and output side member of a clutch is an automatic transmission for cars according to claim 15 arranged at the periphery of moderation planetary gear.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to arrangement of each change gear component in the gear train about the automatic transmission for cars.

[0002]

[Description of the Prior Art] For improvement in fuel consumption indispensable not only to reservation of the drivability of a car but energy saving, the automatic transmission for cars has the demand of multistage-izing, and such a demand to a change gear style is shifting to the thing of the 5th speed from the thing of the conventional advance 4th speed. Meanwhile, in order to realize further multistage-ization in the limited car loading tooth space, much more formation of a small element of a gear train and the simplification of a device are needed. Then, the gear train which attains advance 6 ** and the go-astern 1st speed using the planetary-gear set which consists of the minimum gear change element is proposed in JP,4-219553,A. The gear train concerning this proposal makes the input rotation to a change gear style, and two moderation rotations which slowed it down input into the planetary-gear set which consists of four gear change elements of a change gear style suitably as an input from which two rates differ, and attains multistage advance 6 **.

[0003]

[Problem(s) to be Solved by the Invention] Although the gear train configuration concerning the above-mentioned proposal is very rational in the number of the number of gear change elements per gear ratio, the clutch to need, and brakes, it includes the trouble in respect of practical use which should be improved. As a clutch which inputs the moderation rotation from moderation planetary gear into two elements with which planetary-gear sets differ as a description of the above-mentioned gear train especially, respectively, although two moderation rotation transfer clutches are needed, these clutches need reservation of a bigger torque capacity than the clutch which inputs the usual non-slowng down rotation from the place which transmits the torque amplified by moderation. Since two moderation rotation transfer clutches are arranged to the one side of moderation planetary gear by the above-mentioned Prior art about this point, Since it becomes the arrangement along which the connection member which connects the clutch of another side and one element of a planetary-gear set with the periphery side of one clutch passes and the tooth space by the side of the outer diameter of one clutch is restrained, The capacity reservation by expansion of the outer diameter is difficult, and in order to require reservation of the capacity by increasing the configuration number of sheets of the friction member of the multiple-disc-clutch engagement section generally decided by the outer diameter and configuration number of sheets of a friction member, there is a trouble which causes the enlargement and the increment in weight in a change gear by increase of a shaft-orientations dimension.

[0004] Then, this invention aims at offering the automatic transmission for cars which secured the torque capacity of two clutches for a moderation input while avoiding enlargement of a change gear style in the change gear style which attains multistage gear change in inputting two moderation rotations into a planetary-gear set.

[0005]

[Means for Solving the Problem] Two clutches with which this invention delivers the moderation rotation to which it passed through these moderation planetary gear at least moderation planetary gear in order to attain the above-mentioned purpose, In the automatic transmission for cars which attains a multistage gear ratio with the planetary-gear set into which the moderation rotation which passed through these two clutches is inputted To the one side of said planetary-gear set, the 1st and 3rd clutches inputted into two elements with which planetary-gear sets differ, respectively the moderation rotation which passed through moderation

planetary gear and these moderation planetary gear The 3rd clutch is made into a planetary-gear set side from the 1st clutch, and it is arranged. The input flank material of the 1st clutch It is characterized by having connected with the input flank material of the output element and the 3rd clutch of moderation planetary gear, and connecting the output side member of the 1st clutch with one side of said two elements of a planetary-gear set through the inner circumference of the 3rd clutch.

[0006] When using the above-mentioned change gear as the change gear of advance 6 **, and said planetary-gear set While the 1st element is connected with the output side member of the 1st clutch and the 2nd element is connected with the output side member of the 3rd clutch It is effective for a stop in a change gear case to be enabled by the 1st stop means, and for a stop in a change gear case to be enabled by the 2nd stop means, and to consider as the configuration by which the 4th element was connected with the output member, while connecting with the output side member of the 2nd clutch into which the 3rd element inputs non-slowng down rotation.

[0007] And as for said moderation planetary gear, it is effective to consider as the configuration which had one element fixed by the boss section which carries out total material from a change gear case.

[0008] Furthermore, said change gear case has a support wall, the 1st clutch is arranged on the boss section, and, as for the 3rd clutch, it is effective to consider as the configuration arranged near the support wall.

[0009] Furthermore, as for said 3rd clutch, it is effective to consider as the configuration supported on the body prolonged in shaft orientations from a support wall.

[0010] When making it output with a concurrency shaft from said change gear especially, said output member is used as counter gear, and, as for these counter gear, it is effective to consider as the configuration arranged to the 3rd clutch at the other side of a support wall.

[0011] As for said support wall, in the above-mentioned case, it is effective to consider as the configuration which has the body which supports counter gear.

[0012] Moreover, said change gear case has a support wall, the 1st clutch is arranged at the one side of a support wall, and, as for the 3rd clutch, it is effective to consider as the configuration arranged at the other side.

[0013] Furthermore, as for said 1st and 3rd clutches, it is effective to consider as the configuration supported on the body prolonged in shaft orientations from a support wall.

[0014] Moreover, as for the input flank material of said 1st clutch, it is effective to consider as the configuration arranged towards the sense in which considers as the clutch drum which connotes a hydraulic servo, and the cylinder of a hydraulic servo carries out opening to a moderation planetary-gear side.

[0015] Moreover, as for the output side member of said 3rd clutch, it is effective to consider as the configuration connected with one element of a planetary-gear set towards the sense in which considers as the clutch drum which connotes a hydraulic servo, and the cylinder of a hydraulic servo carries out opening to a support wall in an opposite direction.

[0016] Furthermore, as for said 1st stop means, it is effective to consist of band brakes and to consider the peripheral face of the clutch drum of the 3rd clutch as the configuration made into the engagement side of a band.

[0017] Furthermore, as for said 2nd clutch, it is effective to consider as the configuration arranged near the moderation planetary gear.

[0018] Furthermore, the input flank material of said 2nd clutch is used as a clutch drum, and, as for this clutch drum, it is effective to consider as the configuration used as the input member to moderation planetary gear.

[0019] Moreover, the output side member of said 2nd clutch is used as a clutch drum, and this clutch drum can also be considered as the configuration connected with the 3rd element of a planetary-gear set through the intermediate shaft.

[0020] Furthermore, as for the friction member which connects said the 2nd input flank material and output side member of a clutch, it is effective to consider as the configuration arranged at the periphery of moderation planetary gear.

[0021]

[Function and Effect of the Invention] With the configuration of the claim 1 above-mentioned publication, the input flank material of the 3rd clutch Since it connects with the output element of moderation planetary gear through the input flank material of the 1st clutch and connects with the planetary-gear set through the inner circumference side of the 1st clutch further It can abolish that the member which transmits output rotation of moderation planetary gear to a planetary-gear set through the 1st and 3rd clutches passes along the periphery of both clutches. Therefore, major-diameter-ization of the 1st and 3rd clutches which transmit

the torque amplified through moderation planetary gear being attained, and suppressing the increment in the shaft-orientations dimension by the increment in the configuration number of sheets of a friction member with torque increase, the reservation of torque-transmission capacity corresponding to transfer torque becomes easy, and can constitute a change gear in a compact.

[0022] Next, with a configuration according to claim 2, the change gear style of the gear ratio of the compact and good 6 ** which can attain the above-mentioned effectiveness is realizable.

[0023] And with a configuration according to claim 3, since one element of moderation planetary gear is fixable using a change gear case, arrangement of the support as a support means of dedication for immobilization can be made unnecessary.

[0024] Next, with a configuration according to claim 4, since hydraulic pressure supply becomes possible from the support wall of the near to the hydraulic servo of the 3rd clutch, the supply oilway to a hydraulic servo can be shortened and the responsibility over hydraulic pressure supply can be improved. Moreover, since each other can be offset by losing the member which passes along the periphery of the 1st and 3rd clutches the part to which axial length is extended by arrangement of a support wall when only the part which secured torque-transmission capacity by major-diameter-ization of both clutches shortens the axial length of both clutches, the elongation of the axial length of a change gear can be suppressed to the minimum.

[0025] Moreover, with a configuration according to claim 5, since direct hydraulic pressure supply can be carried out from the body of a support wall to the hydraulic servo of the 3rd clutch, without passing through other rotation members, the number of seal rings for the sealing device of a supply oilway can be lessened to it, the sliding friction produced with a seal ring can be reduced to it, and the transmission efficiency of a change gear can be raised to it.

[0026] Moreover, with a configuration according to claim 6, since a support wall required for support of counter gear and the support wall for the hydraulic pressure supply to the 3rd clutch can be communalized, the axial length of a change gear can be shortened.

[0027] Furthermore, with a configuration according to claim 7, the counter gear which transmit the torque amplified by gear change can be certainly supported with a support wall.

[0028] Moreover, with both configurations according to claim 8, since the supply way of the oil pressure to the hydraulic servo of both clutches can be shortened since supply of the oil pressure to the hydraulic servo of the 1st and 3rd clutches can be performed from the support wall contiguous to both clutches, and the die length of an oilway can moreover be equated mostly, the responsibility of each clutch to hydraulic pressure supply can be improved, and the control characteristic can be doubled. Moreover, since each other can be offset by losing the member which passes along the periphery of the 1st and 3rd clutches the part to which axial length extends by arrangement of a support wall when only the part which secured torque-transmission capacity by major-diameter-ization of both clutches shortens the axial length of both clutches, the elongation of the axial length of a change gear can be suppressed to the minimum.

[0029] Moreover, with both configurations according to claim 9, support can be stabilized more compared with the case where the 1st and 3rd clutches are supported in a change gear case through moving-part material, such as a revolving shaft, by supporting in a change gear case and the support wall of one. Moreover, by performing supply of the oil pressure to the hydraulic servo of the 1st and 3rd clutches directly, without passing through the rotation member of both others from a support wall, since the seal ring which carries out the sealing device of the supply way of oil pressure can be reduced, the sliding friction produced with a seal ring can be reduced, and the transmission efficiency of a change gear can be raised.

[0030] Moreover, with a configuration according to claim 10, it can carry out easily, without being able to expose this drum to the outermost periphery of a change gear style, and this embedding a sensor for detection of input rotation indispensable for change gear control by using the input flank material of the 1st clutch as a clutch drum, at the inner of a change gear case. Moreover, leading about of the complicated connection member in the case of arranging a clutch friction member using the periphery tooth space of moderation planetary gear is avoidable by turning a hydraulic servo to a moderation planetary-gear side.

[0031] Moreover, with a configuration according to claim 11, about the 3rd clutch, leading about of the complicated connection member in the case of arranging a clutch friction member using the periphery tooth space of moderation planetary gear is avoided, a complicated connection member can take about the support to the support wall of a clutch drum, and connection to the input element of a planetary-gear set, and they can be performed by turning the hydraulic servo to a support wall and an opposite direction that there is nothing.

[0032] With a configuration according to claim 12, the 1st stop means by moreover, the thing to consider as

the band brake which can make very small the direction arrangement tooth space of a path The tooth space of the outer-diameter direction of the 3rd clutch is secured considering as the arrangement which piled up the 1st stop means and 3rd clutch connected with the 2nd element of a planetary-gear set both in the direction of a path. Major-diameter-ization of this clutch can be attained and the axial length of a clutch can be shortened by reservation of the torque-transmission capacity by it.

[0033] Moreover, since it becomes the configuration which has arranged collectively the 2nd clutch and 1st and 3rd clutches with which torque-transmission capacity differs near the moderation planetary gear with the configuration according to claim 13, The friction member as a component of the 2nd clutch which can be constituted from torque-transmission capacity being small in a minor diameter The intensive arrangement repeated to the direction inside of a path to the friction member of other clutches can be taken, and it becomes reducible [the arrangement tooth spaces by it], and becomes miniaturizable [the whole change gear style].

[0034] Moreover, with a configuration according to claim 14, since the input flank material of the 2nd clutch can be communalized with the connection member to moderation planetary gear, the power transfer member which crosses a change gear style in the direction of a path can be reduced, and the axial length of a change gear style can be shortened.

[0035] Moreover, with a configuration according to claim 15, by connecting it with an intermediate shaft, using the clutch drum of the 2nd clutch as an output side member, since the clutch hub as input flank material will be located in an input side, the connection configuration to the input side of a clutch hub can be simplified.

[0036] Moreover, with a configuration according to claim 16, it becomes miniaturizable [the change gear style by reduction of the arrangement tooth spaces of the 2nd clutch] by making the input flank material of the 2nd clutch into a clutch hub, and considering as the member which communalized this hub and the input element of moderation planetary gear.

[0037]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained along with a drawing. Drawing 1 shows the gear train of the 1st operation gestalt of the automatic transmission for cars which applied this invention by the skeleton. This automatic transmission has taken the gestalt of the vertical type for front engine Riyadh live (FR) vehicles. The moderation planetary gear G1, Three clutches (C-1 to C-3) containing two clutches which transmit the moderation rotation which passed through the moderation planetary gear G1, A multistage gear ratio shall be attained by the planetary-gear set G into which the moderation rotation which passed through two clutches (C-1, C-3), the 1st of them and the 3rd, is inputted.

[0038] And while the 1st element S3 is connected with the output side member of the 1st clutch (C-1) and the 2nd element S2 is connected with the output side member of the 3rd clutch (C-3), the planetary-gear set G While connecting with the input flank material of the 2nd clutch (C-2) into which a stop in the change gear case 10 is enabled by the 1st stop means (B-1, F-1, B-2), and the 3rd element C2 (C3) inputs non-slowng down rotation A stop in the change gear case 10 is enabled by the 2nd stop means (B-3, F-2), and the 4th element R3 (R2) is connected with the output shaft 19 as an output member. In this automatic transmission, engagement release of each clutch and the stop means is alternatively carried out by the feeding and discarding of the oil pressure of each hydraulic servo of these clutches by the hydraulic control which is not illustrated, and a stop means, and achievement of the gear ratio of advance 6 ** and the go-astern 1st speed is enabled by this gear train configuration.

[0039] Hereafter, the gear train of this operation gestalt is further explained to a detail. With reference to drawing 1, the configuration by which the torque converter 2 with lock-up clutch 20 connected with the engine which is not illustrated at the foremost part of that change gear style has been arranged, and the change gear style has been arranged at that posterior part is taken with this automatic transmission. A torque converter 2 is equipped with the pump impeller 21, the turbine runner 22, the stator 23 arranged among them, the one-way clutch 24 which makes the change gear case 10 carry out one direction rotation engagement of the stator 23, and the stator shaft 25 which fixes the inner ball race of an one-way clutch to the change gear case 10.

[0040] The planetary-gear set G which forms the subject of a change gear style The sun gear S3 of the minor diameter as the 1st element, and the sun gear S2 of the major diameter as the 2nd element, The long pinion P2 which is a pinion which gears mutually, and gears to the ring wheel R3 (R2) as the 4th element while one of these gears to the sun gear S2 of a major diameter, It considers as the RABINIYO-type gear set which consists of carriers C2 and C3 unified as the 3rd element which supports the pinions P2 and P3 of the pair

which another side becomes from the short pinion P3 which gears to the sun gear S3 of a minor diameter. In addition, although a ring wheel R3 (R2) and carriers C2 and C3 are caught with two elements theoretically different, respectively among the above-mentioned elements Since it can be called one element if the former is actually one element and the latter is seen as a rotation element by unification In future explanation, when it is in the periphery side of a sun gear S2 according to physical relationship with sun gears S2 and S3 about the former and is in the sign R2 and periphery side of a sun gear S3, a sign R3 is attached, and writing together of one sign is omitted about the latter.

[0041] The moderation planetary gear G1 consist of simple planetary gear, and it connects with the input shaft 11 which stands the ring wheel R1 as the input element in a row in the turbine runner of said torque converter. While the carrier C1 as an output element is connected with the input flank material of the 1st clutch (C-1), through this input flank material, it connects with the input flank material of the 3rd clutch (C-3), and the sun gear S1 as one element which takes reaction force is fixed to the change gear case 10.

[0042] The automatic transmission which consists of such a configuration changes gears based on a car load in the range of the gear ratio according to the range chosen by the operator by control by the electronic control and hydraulic control which are not illustrated. Drawing 3 diagrammatizes and shows the gear ratio attained by engagement and release (engagement and the engagement which does not carry out to the engagement only at the time of engine brake by release and ** mark, and does not carry out a direct action to achievement of a gear ratio by - mark by the-less mark are expressed with O mark) of each clutch and a brake. Moreover, drawing 2 shows the relation between the gear ratio attained by engagement (those engagement is expressed with - mark) of each clutch and a brake, and the rotational frequency ratio of each gear change element at that time with a velocity diagram.

[0043] So that drawing 2 and drawing 3 may be combined, referred to and understood the 1st ** (1ST) Engagement of a clutch (C-1) and a brake (B-3) (in this gestalt, although it replaces with engagement of this brake (B-3) and automatic engagement of an one-way clutch (F-2) is used so that it may understand with reference to an actuation table) why the reason for using this engagement and this engagement are equivalent to engagement of a brake (B-3) is explained in full detail behind. It is attained. For this gear ratio, reaction force is taken on the carrier C3 with which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 shown in drawing 1 was inputted into the minor diameter sun gear S3 via the clutch (C-1), and was stopped by engagement of an one-way clutch (F-2), and moderation rotation of the maximum reduction gear ratio of a ring wheel R3 is outputted to an output shaft 19.

[0044] Next, the 2nd ** (2ND) is attained by engagement (why these engagement is equivalent to engagement of a brake (B-1) is explained in full detail behind.) of the brake (B-2) which confirms engagement and it of a clutch (C-1) and the one-way clutch (F-1) equivalent to engagement of a brake (B-1). For this gear ratio, reaction force is taken to the major-diameter sun gear S2 with which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 was inputted into the minor diameter sun gear S3 via the clutch (C-1), and was stopped by engagement of a brake (B-2) and an one-way clutch (F-1), and moderation rotation of a ring wheel R3 is outputted to an output shaft 19. The reduction gear ratio at this time becomes smaller than the 1st ** (1ST) so that it may see to drawing 2.

[0045] Moreover, the 3rd ** (3RD) is attained by coincidence engagement of a clutch (C-1) and a clutch (C-3). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 Since it is inputted into the major-diameter sun gear S2 and the minor diameter sun gear S3 via a clutch (C-1) and a clutch (C-3) at coincidence, respectively and the planetary-gear set G will be in a direct connection condition, Rotation of the same ring wheel R3 as the input rotation to both sun gears is outputted to an output shaft 19 as rotation slowed down to rotation of an input shaft 11.

[0046] Furthermore, the 4th ** (4TH) is attained by coincidence engagement of a clutch (C-1) and a clutch (C-2). In this case, the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 by one side is inputted into a sun gear S3 via a clutch (C-1). The non-slowning down rotation inputted via the clutch (C-2) from the input shaft 11 on the other hand is inputted into a carrier C3, and middle rotation of two input rotations is outputted to an output shaft 19 as rotation of the ring wheel R3 slightly slowed down to rotation of an input shaft 11.

[0047] Next, the 5th ** (5TH) is attained by coincidence engagement of a clutch (C-2) and a clutch (C-3). In this case, the rotation which the non-slowning down rotation as which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 by one side was inputted into the sun gear S2 via the clutch (C-3), and was inputted via the clutch (C-2) from the input shaft 11 on the other hand was inputted into the carrier C2, and accelerated it more slightly than rotation of the input shaft 11 of a ring wheel R3 is outputted to an output shaft 19.

[0048] And the 6th ** (6TH) is attained by engagement of a clutch (C-2) and a brake (B-1). In this case, non-slowng down rotation is inputted only into a carrier C2 via a clutch (C-2) from an input shaft 11, reaction force is taken to the sun gear S2 stopped by engagement of a brake (B-1), and the rotation which accelerated the ring wheel R3 further is outputted to an output shaft 19.

[0049] In addition, go-astern (REV) is attained by engagement of a clutch (C-3) and a brake (B-3). In this case, reaction force is taken on the carrier C2 with which the rotation slowed down through the moderation planetary gear G1 from the input shaft 11 was inputted into the sun gear S2 by the C-clutch 3 course, and was stopped by engagement of a brake (B-3), and the inversion of a ring wheel R3 is outputted to an output shaft 19.

[0050] Thus, each gear ratio attained serves as a good rate step at equal intervals comparatively to each gear ratio so that it may understand qualitatively on the velocity diagram of drawing 2 with reference to spacing of the vertical direction of O mark which shows the velocity ratio of ring wheels R2 and R3. If a numeric value is set up and this relation is expressed quantitatively concretely, it will become a step between the gear ratio shown in drawing 3. The gear ratio in this case is the case where it is set as gear ratio $\lambda_3=0.375$ of the sun gear S1 of the moderation planetary gear G1, the sun gear S2 by the side of gear ratio $\lambda_1=0.556$ of a ring wheel R1, and the major-diameter sun gear of the planetary-gear set G, the sun gear S3 by the side of gear ratio $\lambda_2=0.458$ of a ring wheel R3, and a minor diameter sun gear, and a ring wheel R3, and gear ratio width of face is set to 6.049.

[0051] Here, the relation of the one-way clutch (F-2) and brake (B-3) which touched previously, and the relation between an one-way clutch (F-1) and both brakes (B-1, B-2) are explained. both [these] brakes serve as the so-called friction element to which one release, simultaneously engagement of another side are carried out at the time of an up-and-down shift by both gear change interstage and which holds again and is carried out so that it may see in engagement / release relation of both the brakes at the time of the 1st above ** and the 2nd ** (B-1, B-3). A hold substitute of such a friction element will cause addition of the control valve for it, complication of a hydraulic circuit, etc., in order to need the precise concurrency control of the engagement pressure of the hydraulic servo which operates them, and solution pressure discharge and to perform such control. By then, the thing to consider as a setup which doubled the engagement direction of an one-way clutch (F-2) in the reaction force torque support direction at the time of the 1st ** by the 1st ** and the 2nd ** with this gestalt using the reaction force torque concerning a carrier C2 being reversed A stop function equivalent to engagement of a parenthesis top brake (B-3) to an one-way clutch (F-2), Demonstrate the automatic release function which is not obtained in this brake, and it replaces with engagement of the brake at the time of the 1st ** (B-3). (However, since the direction of the reaction force torque which starts a carrier C2 in the state of the car coast of a wheel drive is reversed to the condition of an engine drive, in order to acquire the engine brake effectiveness) as ** mark shows, engagement of a brake (B-3) is needed for drawing 3 -- the carrier C2 is stopped -- it divides and comes out. Therefore, when attaining a gear ratio, the configuration which attains the 1st ** by engagement of a brake (B-3) can also be taken, without preparing an one-way clutch.

[0052] It can be realized about the case where the same relation as the above is a sun gear S2, and an one-way clutch (F-1) can be made to demonstrate a function equivalent to engagement of a parenthesis top brake (B-1) by considering as a setup which doubled the engagement direction of an one-way clutch (F-1) in the reaction force torque support direction at the time of the 2nd ** in this case. However, since unlike a carrier C2 this sun gear S2 is not only engaged in order to acquire the engine brake effectiveness at the time of the 2nd **, but is a gear change element stopped also for the 6th *****, a brake (B-1) is needed. Moreover, although a sun gear S2 rotates to hard flow to an input hand of cut at the time of the 1st ***** so that it may understand also with the velocity diagram of drawing 2, in the case of the gear ratio of the 3rd more than **, it rotates in the same direction as an input hand of cut. Therefore, since an one-way clutch (F-1) cannot be connected with a direct holddown member, it is considering effectiveness of an engagement condition as the controllable configuration by serial arrangement with a brake (B-2).

[0053] Next, the cross section [-izing / the detail / further / the gear change device section of the above-mentioned gear train / the cross section / the ** type] shows drawing 4. Although the same reference mark is attached and being replaced with explanation about each component previously explained with reference to the skeleton, the details which cannot be referred to from a skeleton are explained below. In addition, vocabulary called a clutch through this specification The hydraulic servo as an actuation means which carries out engagement actuation of the friction member further shall be named a friction member, and the drum as the power [supporter material-cum-] transfer member and a hub generically. About a brake When it is the same multi-plate configuration, a clutch The hydraulic servo as the hub as the friction member and its

torque-transmission [supporter material-cum-] member and a means which carries out engagement actuation of the friction member shall be named generically. In a band-brake configuration A brake band, the drum which constitutes the engagement side, and the hydraulic servo which concludes a brake band shall be named generically.

[0054] first, the change gear case 10 consists of the front end wall 10a in tubed [which has 10d of cylinder boss sections by which total material was carried out to cylinder boss section 10b by which total material was carried out toward the interior toward the interior from back end wall 10c] -- having -- the change gear case 10 -- it fixes in the center mostly and support wall 10A is prepared. Support wall 10A has 10f [of side bodies], before being ahead prolonged in shaft orientations in the inner circumference side of direction wall of path 10e connected with the change gear case 10, and direction wall of path 10e. In addition, Sign Sn shows the input rotation sensor which detects input rotation of a change gear style for gear change control.

[0055] Next, with this gestalt, although the input shaft 11 which inputs the power via a torque converter into a change gear style is divided into before flank part 11A and after flank part 11B mainly for the facilities on processing, it is considered as the configuration which was made to carry out fitting closely and was made to unify on parenchyma by a spline etc. mutually. Before [an input shaft 11] flank part 11A is connected with the turbine runner 22 of a torque converter 2, the inner circumference of front end wall 10a of a change gear case supports the front end section through bearing in the change gear case 10, the tip inner circumference of cylinder boss section 10b supports the back end section through bearing, and rotation of it is enabled to the change gear case 10. Fit-in support is carried out through bearing in the crevice of an output shaft 19, and the back end section of after [an input shaft] flank part 11B is supported free [rotation] through the output shaft 19 by 10d of cylinder boss sections of the change gear case 10. And the input section to the moderation planetary gear G1 is used as the flange formed near the back end section of front flank part 11A, and this flange is connected with the ring wheel R1. Moreover, immobilization is fixed near the back end section of back flank part 11B, connection at the 2nd clutch (C-2) is used as the flange of sleeve member 11C which constitutes the inner circumference side of the hydraulic servo 50 of the 2nd clutch (C-2), and it is made by fixing the clutch drum 51 to this flange.

[0056] An output shaft 19 is supported by the inner circumference of 10d of cylinder boss sections of a change gear case free [rotation] through bearing in the front end section, and extension housing fixed to the backmost part of the change gear case 10 through bearing supports the back end section free [rotation]. And the connection section to the ring wheel R3 of the planetary-gear set G is used as the flange at output-shaft 19 tip, and is considered as the configuration which the drum-like member fixed to it connected with the ring wheel R3.

[0057] the planetary-gear set G -- ***** of after [an input shaft] flank part 11B -- it is arranged mostly at the periphery side of a central part, and the minor diameter sun gear S3 is supported by the periphery of back flank part 11B free [rotation], and is further supported free [rotation of the major-diameter sun gear S2] at the periphery. The carriers C2 and C3 which support the long pinion P2 and the short pinion P3 are unified, the front end section is supported free [rotation] by shank 11E ahead prolonged from a sun gear S2, and the back end section is supported by back flank part 11B free [rotation]. Since this planetary-gear set G does not have a ring wheel in the periphery by the side of the 1st planetary gear G2 of one of these, the outer diameter differs from the 2nd planetary-gear G3 side with a ring wheel R3 mutually.

[0058] The moderation planetary gear G1 are arranged at the tip periphery of cylinder boss section 10b of a change gear case, and the sun gear S1 as the fixed element is being fixed to cylinder boss section 10b by spline fitting etc. Support-at-one-end support of the carrier C1 which constitutes the output element of the moderation planetary gear G1 is carried out through bearing at the periphery of cylinder boss section 10b.

[0059] According to the basic feature of this invention, in the one side of the planetary-gear set G, i.e., this gestalt, the 1st and 3rd clutches (C-1, C-3) which input into the sun gear S3 and sun gear S2 of the planetary-gear set G the moderation planetary gear G1 and the moderation rotation which passed through it, respectively carry out the 3rd clutch (C-3) from the 1st clutch (C-1) at a planetary-gear set side, and are arranged at the before side. And the clutch drum 31 as input flank material of the 1st clutch (C-1) is connected with the input flank material 46 of the carrier C1 of the moderation planetary gear G1, and the 3rd clutch (C-3). Moreover, the clutch hub 36 as an output side member of the 1st clutch (C-1) is connected with the sun gear S3 of the planetary-gear set G through the inner circumference of the 3rd clutch (C-3).

[0060] The 1st clutch (C-1) consists of hydraulic servos 30 which make a friction member engage with the clutch hub 36 as an output side member which outputs the torque delivered the clutch drum 31 as the friction member 35 which consists of the friction material and separator plate of a multi-plate configuration, and input flank material which transmits torque to a friction member by engagement of the friction member

35. The clutch drum 31 has a tubed part in the inside-and-outside periphery, is considered as the configuration which demarcates the cylinder of a hydraulic servo 30 and connotes a hydraulic servo 30 between the tubed part by the side of inner circumference, and the tubed part of the minor diameter by the side of a periphery, and is using as the supporter of the friction member 35 the tubed part of the major diameter whose diameter was expanded. The friction member 35 is supported by the inner circumference of the major-diameter body of the clutch drum 31 by spline engagement in the periphery side of the separator plate, and the periphery of the clutch hub 36 supports the inner circumference side of friction material by spline engagement, and it is arranged between the clutch drum 31 and the clutch hub 36. A hydraulic servo 30 uses the inside of the clutch drum 31 as a cylinder, and is considered as the configuration equipped with the return spring arranged between the piston 32 fitted in it free [shaft-orientations sliding], the cancellation plate by which the shaft-orientations stop was carried out to the inner circumference section of the clutch drum 31, and a piston 32 and a cancellation plate.

[0061] The hydraulic servo 30 is the front of the moderation planetary gear G1, the 1st clutch (C-1) which consists of such a configuration is arranged at the periphery of cylinder boss section 10b, and the friction member 35 is arranged at the periphery of the moderation planetary gear G1. The clutch drum 31 of this 1st clutch (C-1) is arranged towards the sense in which the cylinder of the hydraulic servo 30 by which endocyst was carried out to it carries out opening to the moderation planetary-gear G1 side, and the tubed part by the side of the inner circumference of the clutch drum 31 is connected with the carrier C1 of the moderation planetary gear G1. And the clutch hub 36 is connected with power transfer member 11D supported by the periphery of before [an input shaft] flank part 11A through bearing, and is connected with the sun gear S3 of the planetary-gear set G through this power transfer member.

[0062] The 3rd clutch (C-3) consists of hydraulic servos 40 which make a friction member engage with the clutch drum 41 as an output side member which outputs the torque delivered the clutch hub 46 as the friction member 45 which consists of the friction material and separator plate of a multi-plate configuration, and input flank material which transmits torque to a friction member by engagement of the friction member 45. The clutch drum 41 has a tubed part in the inside-and-outside periphery, is considered as the configuration which demarcates the cylinder of a hydraulic servo 40 and connotes a hydraulic servo 40 between the tubed part by the side of inner circumference, and the tubed part of the minor diameter by the side of a periphery, and is using as the supporter of the friction member 45 the tubed part of the major diameter whose diameter was expanded. The friction member 45 is supported by the inner circumference of the major-diameter body of the clutch drum 41 by spline engagement in the periphery side of the separator plate, and the periphery of the clutch hub 46 supports the inner circumference side of friction material by spline engagement, and it is arranged between the clutch drum 41 and the clutch hub 46. A hydraulic servo 40 uses the inside of the clutch drum 41 as a cylinder, and is considered as the configuration equipped with the return spring arranged between the piston 42 fitted in it free [shaft-orientations sliding], the cancellation plate by which the shaft-orientations stop was carried out to the inner circumference section of the clutch drum 41, and a piston 42 and a cancellation plate.

[0063] The hydraulic servo 40 is behind the moderation planetary gear G1, and is supported by the periphery of 10f [of before / support wall 10A / side bodies] through bearing, the friction member 45 compares with the friction member 35 of said 1st clutch (C-1) the 3rd clutch (C-3) which consists of such a configuration on the periphery of the moderation planetary gear G1, and it is arranged in the back. The cylinder of the hydraulic servo 40 by which endocyst was carried out to it is arranged towards the sense which carries out opening to the moderation planetary-gear G1 side, and the clutch drum 41 of this 1st clutch (C-3) is connected with the major-diameter sun gear S2 of the planetary-gear set G through power transfer member 11E in which the tubed part by the side of the inner circumference of the clutch drum 41 was fitted by the periphery of power transfer member 11D. And the clutch hub 46 is connected with the clutch drum 31 of the 1st clutch (C-1).

[0064] The 2nd clutch (C-2) consists of hydraulic servos 50 which make a friction member engage with the clutch hub 56 as an output side member which outputs the torque delivered the clutch drum 51 as the friction member 55 which consists of the friction material and separator plate of a multi-plate configuration, and input flank material which transmits torque to a friction member by engagement of the friction member 55 similarly. The clutch drum 51 has a tubed part on the periphery, is considered as the configuration which demarcates the cylinder of a hydraulic servo 50 and connotes a hydraulic servo 50 between said sleeve member 11C by the side of inner circumference, and the tubed part of the minor diameter by the side of a periphery, and is using as the supporter of the friction member 55 the tubed part of the major diameter whose diameter was expanded. The friction member 55 is supported by the inner circumference of the

major-diameter body of the clutch drum 51 by spline engagement in the periphery side of the separator plate, and the periphery of the clutch hub 56 supports the inner circumference side of friction material by spline engagement, and it is arranged between the clutch drum 51 and the clutch hub 56. A hydraulic servo 50 uses the inside of the clutch drum 51 as a cylinder, and is considered as the configuration equipped with the return spring arranged between the piston 52 fitted in it free [shaft-orientations sliding], the cancellation plate by which the shaft-orientations stop was carried out to the inner circumference section of the clutch drum 51, and a piston 52 and a cancellation plate.

[0065] That hydraulic servo 50 is behind the planetary-gear set G, this 2nd clutch (C-2) is fixed to an input shaft 11, it is supported, and the friction member 55 is arranged ahead of the hydraulic servo 50. And connection support of the clutch hub 56 is carried out at the carrier C2 of the planetary-gear set G.

[0066] The brake (B-1) which constitutes one side of the 1st stop means is equipped with the band 6 which engages with the peripheral face of the clutch drum 41 of the 3rd clutch (C-3), and let it be the band brake which uses the clutch drum 41 as a brake drum. Thus, although the moment which makes a drum shaft incline by the circumference of the deflection of a drum acts by the direction load of a path at the time of brake conclusion when a brake is considered as a band-brake configuration With this gestalt, the clutch drum 41 of the 3rd clutch (C-3) supported by 10f [of before / support wall 10A / side bodies]' as mentioned above by considering as a brake drum In the direction inside of a path of the band conclusion section, since it becomes the structure which supported the drum in the change gear case, it has composition which does not exert the load at the time of brake conclusion on other members. In addition, illustration is omitted about the hydraulic servo of this brake (B-1).

[0067] The inner ball race is connected with the drum 41 of the 3rd clutch (C-3), and the one-way clutch (F-1) which constitutes another side of the 1st stop means is considered as the configuration united with the hub 86 of a brake (B-2) in an outer race, and is arranged in the front of the 1st clutch (C-1), i.e., the foremost part of a change gear style. Let the brake (B-2) which stops an outer race in the change gear case 10 be the brake of the multi-plate configuration which uses as the friction member 85 the separator plate by which engagement support was carried out in the hub 86 at the friction material by which engagement support was carried out, and the inner circumference spline of the change gear case 10. The hydraulic servo 80 of a brake (B-2) uses front end wall 10a of the change gear case 10 as a cylinder, and is considered as the configuration equipped with the piston 82 fitted in it free [sliding], and the return spring which a shaft-orientations stop is carried out to front end wall 10a of the change gear case 10, and contacts a piston 82.

[0068] The brake (B-3) which constitutes one side of the 2nd stop means It considers as the multiple disc brake which uses the friction material and separator plate of many plates as the friction member 75. Stop support is carried out at the spline of change gear case 10 inner circumference, and engagement support is carried out in the hub 76 where friction material was fixed by the carrier C2, and a separator plate makes the periphery side tooth space by the side of the planetary gear G2 without the ring wheel of the planetary-gear set G carry out a polymerization in the direction of a path, and is arranged. The hydraulic servo 70 of a brake (B-3) uses back end wall 10c of the change gear case 10, and 10d of cylinder boss sections as a cylinder, and is considered as the configuration equipped with the piston 72 fitted in it free [sliding], and the return spring which a shaft-orientations stop is carried out to 10d of cylinder boss sections of the change gear case 10, and contacts a piston 72. The extension which is extended along with the peripheral wall of the change gear case 10 of a piston 72, and results in the back end of the friction member 75 carries out fitting of the periphery to the spline of change gear case 10 peripheral wall, and the baffle is carried out.

[0069] And the inner ball race is connected with the front end section of a carrier C2, and an one-way clutch (F-2) in parallel with the brake (B-3) which constitutes another side of the 2nd stop means makes an outer race engage with the inner circumference of the change gear case 10, and is arranged between support wall 10A and the planetary-gear set G.

[0070] Thus, in the configuration of the 1st operation gestalt, the RABINIYO-type planetary-gear set G was used for the change gear style, and the compact and the change gear style of the gear ratio of good 6 ** are realized in inputting moderation rotation of the moderation planetary gear G1 which mind [the / two / S3 and S2] two clutches (C-1, C-3). And since the sun gear S1 of the moderation planetary gear G1 is fixed using the change gear case 10, arrangement of the support as a support means of dedication for immobilization is made unnecessary. Furthermore, the hydraulic servo 30 of the 1st clutch C-1 is arranged on the cylinder boss section 10b periphery of the moderation planetary-gear G1 front. Since it is considering as the structure which arranges the hydraulic servo 40 of the 3rd clutch C-3 on 10f periphery of before [support wall 10A of moderation planetary-gear G1 back] side bodies Without passing the hydraulic-pressure-supply oilway of the hydraulic servo of both clutches through other shafts, direct continuation

could be carried out, the oilway volume as space which must be made full of an oil by that cause was made small, and the responsibility over hydraulic pressure supply is received cylinder boss section 10b and 10f [of before side bodies]. Moreover, since direct hydraulic pressure supply can be carried out from body 10f of support wall 10A to the hydraulic servo 40 of the 3rd clutch (C-3), without passing through other rotation members, the number of seal rings for the sealing device of a supply oilway is lessened, and the sliding friction produced with a seal ring is reduced. The 1st stop means by moreover, the thing to consider as the band brake which can make very small the direction arrangement tooth space of a path. The tooth space of the outer-diameter direction of the 3rd clutch (C-3) is secured considering as the arrangement which piled up the brake (B-1) connected with both the sun gears S2 of the planetary-gear set G, and the 3rd clutch (C-3) in the direction of a path. Major-diameter-ization of this clutch is attained, by reservation of the torque-transmission capacity by it, the configuration number of sheets of the friction member 45 is reduced, and the axial length of a clutch is shortened.

[0071] By the way, with said 1st operation gestalt, although the one-way clutch (F-1) and the brake (B-2) have been arranged to the front of the 1st clutch (C-1), i.e., the foremost part of a change gear style, these arrangement locations can be changed suitably. And it shows it. [drawing 5] [the cross-section structure of the automatic transmission of the 2nd operation gestalt which has arranged the one-way clutch (F-1) and the brake (B-2) to the front of support wall 10A, i.e., the back of the 3rd clutch (C-3),] [**] [type] Hereafter, the semantics which avoids duplication explains only difference with said 1st operation gestalt in this gestalt.

[0072] In this 2nd operation gestalt, as mentioned above, since arrangement of an one-way clutch (F-1) and a brake (B-2) is changed to the 1st operation gestalt, in connection with it, it is prepared with the gestalt by which the endocyst also of the hydraulic servo 80 of a brake (B-2) is carried out to support wall 10A. The advantage of this configuration, without taking about the periphery side of the 1st clutch (C-1), and connecting the inner ball race of an one-way clutch (F-1) with the drum 31 of the 1st clutch (C-1). Since it can connect with the inner circumference section of the drum 41 of the 3rd clutch (C-3) by the minimum distance, It is in the point that the periphery side of the drum 31 of the 1st clutch (C-1) which transmits output rotation of the moderation planetary gear G1 is opened wide, and is in the point which becomes detectable [input rotation in the drum 31 periphery section of the 1st clutch (C-1)] by that cause. Therefore, with this gestalt, the input rotation sensor Sn is formed in the periphery wall of the change gear case 10.

[0073] With the configuration of this gestalt, especially by connecting the clutch hub 46 of the 3rd clutch (C-3) with the carrier C1 of the moderation planetary gear G1 through the clutch drum 31 of the 1st clutch (C-1). The advantage which lost the member which passes along the periphery of both clutches in order to transmit output rotation of the moderation planetary gear G1 to the 1st and 3rd clutches is employed efficiently. Major-diameter-ization of the 1st and 3rd clutches which transmit the torque amplified through the moderation planetary gear G1 being attained, and suppressing the increment in the shaft-orientations dimension accompanying torque increase, the reservation of torque-transmission capacity corresponding to transfer torque becomes easy, and can constitute a change gear in a compact. Moreover, since the clutch drum 31 of the 1st clutch is connected with the carrier C1 of the moderation planetary gear G1. The drum of the 1st clutch which always rotates can be exposed to the outermost periphery of a change gear style. Since it is not necessary to make front end wall 10a heavy-gage in order to embed Sensor Sn while being able to perform easily detection of input rotation indispensable for change gear control by that cause, without embedding Sensor Sn at the inner of the change gear case 10, axial length can be shortened. Moreover, since each other can be offset by losing the member which passes along the periphery of the 1st and 3rd clutches (C-1, C-3) the part to which axial length is extended by arrangement of support wall 10A when only the part which secured torque-transmission capacity by major-diameter-ization of both clutches shortens the axial length of both clutches, the elongation of the axial length of a change gear can be suppressed to the minimum.

[0074] and with this gestalt, further about the 2nd brake (B-2) of the serial arrangement to the one-way clutch (F-1) and it which have been arranged for the clutch engagement shock mitigation at the time of 1 -> 2 gear change. Since the hydraulic servo 80 of the 2nd brake (B-2) is arranged with the gestalt which it is made to include using support wall 10A, arrangement of the oil pressure servo cylinder accompanying arrangement of the 2nd brake (B-2) has become unnecessary, and, thereby, the increment in components mark is suppressed.

[0075] Next, drawing 6 shows the 3rd operation gestalt which has arranged the one-way clutch (F-1) and the brake (B-2) back [the back of support wall 10A], i.e., the front of the 2nd one-way clutch (F-2), in the cross section [-izing / the cross section / the ** type]. The changed part in the case of this 3rd operation gestalt is

a point of the sense of the connection section of an one-way clutch (F-1), and the hydraulic servo of a brake (B-2). In this case, the inner ball race of an one-way clutch (F-1) is connected in the middle of power transfer member 11E which connects the drum 31 of the 3rd clutch (C-3), and the sun gear S2 of the planetary-gear set G, and the endocyst of the hydraulic servo 80 of a brake (B-2) is carried out to support wall 10A backward towards the friction member 85 arranged in that back. Thereby, since neither an one-way clutch (F-1), a brake (B-2) nor its hydraulic servo 80 is arranged between the hydraulic servo 40 of the 3rd clutch (C-3), and direction wall of path 10e, the oilway in 10f [of before side bodies]' can be shortened.

[0076] Next, unlike old deformation, drawing 7 shows the 4th operation gestalt which lost the one-way clutch (F-1) and the brake (B-2). Although the point that control of a hydraulic servo in case it is a band brake about engagement control of a brake (B-1) becomes complicated, especially as for such a gestalt cannot be denied, it is very effective in compaction of the axial length of a change gear.

[0077] When juxtaposition of an one-way clutch (F-1) and a brake (B-2) is lost from the semantics of the controllability of such a brake (B-1), it is also effective to use a brake (B-1) as the easy multiple disc brake of control from a band brake. Drawing 8 shows the 5th operation gestalt which changed the brake (B-1) into the multi-plate configuration from this meaning to the 4th operation gestalt. Since the friction members 35 and 45 of the 1st and 3rd clutches (C-1, C-3) and the friction member 65 of a brake (B-1) serve as arrangement on a par with shaft orientations in the case of this gestalt, The friction members 35 and 45 of the 1st and 3rd clutches (C-1, C-3) are brought near ahead relatively. The friction member 35 of the 1st clutch (C-1) serves as arrangement in which the periphery of the hydraulic servo 30 and the friction member 45 of the 3rd clutch (C-3) are located in the periphery of the moderation planetary gear G1. And the endocyst of the hydraulic servo 60 of a brake (B-1) is carried out to direction wall of path 10e of support wall 10A, and it is positively arranged towards the friction member 65. In this case, engagement support is carried out at the spline formed in the inner circumference of the peripheral wall of the change gear case 10 in that separator plate, and the friction member 65 serves as arrangement supported by the drum 41 of the 3rd clutch (C-3) considering it as a hub in friction material.

[0078] Next, drawing 9 shows the 6th operation gestalt which lost the body of support wall 10A to the 4th operation gestalt. In the case of this gestalt, it is the supply oilway LR of the oil pressure to the hydraulic servo 40 of the 3rd clutch (C-3). It is making into an oilway space 11H formed of the power transfer members 11D and 11E and Bushes 11F and 11G, and it is only the seal ring of the relative rotation section order pair of support wall 10A and power transfer member 11E, and ***** connection is possible. In the hydraulic pressure supply to the hydraulic servo 40 of the 3rd clutch (C-3), since the advantage of this configuration can make the path of an oilway connection small as compared with the case where a body is minded, it can make small effect of the centrifugal force at the time of hydraulic pressure supply, and is in the point whose controllability of the 3rd clutch improves by that cause.

[0079] With each above operation gestalt, although each arranges the 2nd clutch (C-2) behind the planetary-gear set G, the 2nd clutch (C-2) can adjoin immediately after the moderation planetary gear G1, and can also be arranged. Drawing 10 shows the 7th operation gestalt which takes such a gestalt by the skeleton, and drawing 11 shows more concrete cross-section structure typically. Also in this gestalt, since arrangement of each element becomes being the same as that of the case of the 1st operation gestalt except for the location of the 2nd clutch (C-2), the same cable address as a corresponding element is attached, and it replaces with explanation of each element arrangement in this case, so that it may see to the skeleton of drawing 10.

[0080] In the case of this gestalt, as shown in drawing 11, the configurations of an input shaft 11 differ sharply. since [namely,] an input shaft 11 turns into an intermediate shaft which transmits the input rotation to which the greater part of the overall length passed through the clutch (C-2) unlike an old operation gestalt -- front flank part 11A -- receiving -- after flank part as intermediate shaft 11B -- relativity -- it is supposed that it is pivotable and the fitting section to before [the back flank part 11B front end] flank part 11A is supported through bearing. And the hydraulic servo 50 of the 2nd clutch (C-2) arranged just behind the moderation planetary gear G1 is considered as the configuration by which endocyst is carried out to the back end section of before [an input shaft] flank part 11A, and the clutch drum 51 fixed to it, and the clutch hub 56 is connected with the front end of after [an input shaft] flank part 11B.

[0081] Support wall 10A is made into the gestalt to which 10f of bodies extends before and after shaft orientations to direction wall of path 10e in this case, the inner ball race of the hydraulic servo 40 of the 3rd clutch (C-3) and an one-way clutch (F-1) is supported by 10f [of before side bodies]' free [rotation], and the inner ball race of an one-way clutch (F-2) is being fixed to 10f [of backside bodies]. The endocyst of the hydraulic servo 80 of a brake (B-2) and the hydraulic servo 70 of a brake (B-3) is carried out back to

back at direction wall of path 10e of support wall 10A. Since the torque-transmission capacity of the 2nd clutch (C-2) which transmits non-slowng down rotation is relatively small and ends, the advantage of this arrangement is in the point whose large compaction of the shaft-orientations dimension of a change gear style is attained by the polymerization to the direction of a path of the small friction member 55 of that outer diameter, and the friction member 45 of the 3rd clutch (C-3) to secure torque capacity by major-diameter-ization.

[0082] Moreover, the advantage of this gestalt is also in the point which can communalize the clutch drum 51 of the 2nd clutch (C-2) with the connection member to the moderation planetary gear G1, reduces the power transfer member which crosses a change gear style in the direction of a path by this, and can shorten the axial length of a change gear style.

[0083] Next, drawing 12 shows the configuration of the 8th operation gestalt which has arranged the hydraulic servo 70 of a brake (B-3) at the backmost part of a change gear style like the case of the 1st - the 6th operation gestalt in the above-mentioned 7th operation gestalt.

[0084] Next, the example shown in drawing 13 shows arrangement of the 9th operation gestalt at the time of losing the one-way clutch (F-1) and brake (B-2) in the 8th operation gestalt. By contrast with the 8th operation gestalt of drawing 12 shown with the same proportion, the advantage in this case is in the point whose compaction of large axial length is attained so that clearly.

[0085] Next, to the 1st operation gestalt of the beginning, as for the location sequence of the 1st and 3rd clutches (C-1, C-3) and the moderation planetary gear G1, drawing 14 remains as it is, and shows the 10th operation gestalt which transferred the one-way clutch (F-1) and the brake (B-2) between the moderation planetary gear G1 and the 3rd clutch (C-3). In this case, the arrangement the cylinder of the hydraulic servo 40 by which endocyst was carried out to the clutch drum 41 which constitutes that output side member made [arrangement] the sun gear S2 of the planetary-gear set G connect [arrangement] the 3rd clutch (C-3) with support wall 10A and an opposite direction towards the sense which carries out opening is taken. In detail, support wall 10A is considered as the configuration by which the hydraulic servo 40 by which was considered as the configuration which has 10f [of shaft-orientations bodies prolonged backward]", and endocyst was carried out to the periphery at the clutch drum 41 of the 3rd clutch (C-3) was supported. Although the advantages and disadvantages by this arrangement are the same as that of the relation of the 2nd operation gestalt over the 1st operation gestalt, since both **** support of the clutch drum 41 of the 3rd clutch (C-3) which serves as the brake drum of the 1st brake (B-1) can be carried out with a hydraulic servo 40 and a sun gear S2, the advantage which can prevent now much more certainly the deflection of the drum at the time of brake conclusion is acquired.

[0086] Next, drawing 15 shows the 11th operation gestalt which made reverse physical relationship of the 1st clutch (C-1) and the moderation planetary gear G1 to the above-mentioned 10th operation gestalt, and also made the reverse sense the sense of the 1st clutch (C-1) in connection with it. In this case, the moderation planetary gear G1 fix that sun gear S1 to the periphery of boss section 10b prolonged from the front end wall of the change gear case 10, are arranged, and before the clutch drum 31 which instead connotes the hydraulic servo 30 of the 1st clutch (C-1) is prolonged ahead [shaft-orientations] from support wall 10A, they are supported by the periphery of 10f [of side bodies]'. An essentially different advantage over said each operation gestalt of this arrangement is in the point that it becomes unnecessary to prepare the supply oilway for hydraulic-servo 30 in front end wall 10a of the change gear case where an oilway becomes complicated with usually consisting of oil pump bodies in order to use chiefly front end wall 10a of a gear change case for support of the moderation planetary gear G1. Moreover, since the supply way of the oil pressure to the hydraulic servos 30 and 40 of both clutches can be shortened since supply of the oil pressure to the hydraulic servos 30 and 40 of the 1st and 3rd clutches can be performed from support wall 10A which adjoins both clutches of both, and the die length of an oilway can moreover be equated mostly, the responsibility of each clutch to hydraulic pressure supply can be improved, and the control characteristic can be doubled.

[0087] Next, drawing 16 shows the 12th operation gestalt which has arranged the 2nd clutch (C-2) immediately after the moderation planetary gear G1 to said 10th operation gestalt. The advantage in this case is in the point which can communalize the clutch drum 51 of the 2nd clutch (C-2) with the connection member to the moderation planetary gear G1 like the case of said 7th operation gestalt.

[0088] Next, drawing 17 shows the 13th operation gestalt which changed the location of the 1st clutch (C-1) to said 12th operation gestalt. In this case, the 1st clutch (C-1) is moved to the support wall 10A side, and a hydraulic servo 30 is supported on 10f [of that body]'. The advantage of this arrangement is the same as the advantage of the 11th operation gestalt.

[0089] Although each above operation gestalt materializes this invention with the gestalt of the vertical type for FR vehicles, finally it illustrates two operation gestalten which materialized this invention with the gestalt of a front engine front drive (FF) or the horizontal type transformer axle for rear engine Riyadh live (RR) vehicles.

[0090] Drawing 18 and drawing 19 show the 14th operation gestalt. With this gestalt, although the same configuration as a parenchyma top is taken by the comparison of the skeleton of the gear train of the 1st operation gestalt previously shown in drawing 1, and the skeleton of the gear train of this gestalt shown in drawing 18 so that clearly, 3 shaft configurations which have arranged change gear style 1A on the 1st shaft, and have arranged the 2nd shaft and DIFARENSHA equipment 1C for counter-gear device 1B on the 3rd shaft are taken with horizontal-izing. And on the 1st shaft, it replaces with an output shaft as an output member of a ring wheel R2, and counter drive gear 19A is prepared.

[0091] Counter-gear device 1B is considered as the configuration which is fixed on the counter shaft 12 at it, and has the counter driven gear 13 and the differential-gear drive pinion gear 14, and the counter driven gear 13 is considered as the arrangement of an input shaft 11 with which it gears with to counter drive gear 19A in the center section mostly, and the differential-gear drive pinion gear 14 gears to the differential-gear ring wheel 15 of DIFARENSHA equipment 1C at the foremost part of a change gear style. It shall be fixed to the differential-gear ring wheel 15, shall have DIFARENSHA equipment 1C in the differential case 16 with which the differential gear was arranged in the interior, and it is considered as the configuration in which both the output shafts 17 of a differential gear are connected with a wheel.

[0092] drawing 19 -- being concrete -- a configuration -- ** -- a type ---izing -- a cross section -- being shown -- as -- this -- a gestalt -- **** -- a counter -- a drive -- a gear -- 19 -- A -- the -- three -- a clutch (C-3) -- receiving -- a support -- a wall -- ten -- A -- the other side -- arranging -- having -- a support -- a wall -- ten -- A -- a counter -- a gear drive -- a gear -- 19 -- A -- supporting -- a body -- ten -- f -- " -- having -- a thing -- ** -- carrying out -- having -- the -- a periphery -- bearing -- minding -- a counter -- a gear drive -- a gear -- 19 -- A -- rotation -- free -- supporting -- having -- **** -- .

[0093] And with this gestalt, since the axial length of a change gear device is remarkably restrained by relation with car loading nature compared with said each gestalt, the brake (B-1) as 1st stop means, the one-way clutch of a parallel arrangement, and the combination of a brake have been abolished like the configuration of said 4th operation gestalt. the planetary-gear set G in this gestalt, the moderation planetary gear G1, and the 1- the brake (B-1, B-3) as 1st and 2nd stop means, the arrangement relation of an one-way clutch (F-2), and mutual connection relation are the same as that of the case of the 4th operation gestalt of the account of the real kickback in the 3rd clutch (C-1 to C-3) list.

[0094] However, as a configuration of details, it is arranged at the periphery of 10d of boss sections of the gear change case 10, and in connection with this, the friction member 55 of the 2nd clutch (C-2) is brought near ahead, and is arranged at the periphery of the planetary-gear set G that the 2nd clutch (C-2) should make possible hydraulic pressure supply which does not mind the input shaft 11 to the hydraulic servo 50. Moreover, the hydraulic servo 70 of a brake (B-3) is the gestalt put on it in the direction of a path at the periphery of the hydraulic servo 50 of the 2nd clutch (C-2), and is considered as the configuration made to build in at back end wall 10c of the change gear case 10.

[0095] Next, and it shows it. [drawing 20] [the 15th operation gestalt which made the whole change gear style order reverse to the above-mentioned 14th operation gestalt] [**] [type] Since it is difficult to make a hydraulic servo 70 build in front end wall 10a of the change gear case 10 which usually consists of oil pump bodies at the relation of oilway arrangement when taking with such arrangement, the hydraulic servo 70 of a brake (B-3) is considered as another attachment at the peripheral wall of the change gear case 10, and is arranged at the periphery of the planetary-gear set G. In connection with this, the allowances of the tooth space of the method of the outside of the direction of the path used the friction member 55 of the 2nd clutch (C-2) ahead brought near from the periphery of the planetary-gear set G, and by major-diameter-izing of a hydraulic servo 50, and major-diameter-ization of the friction member 55, it reduced the configuration number of sheets of the friction member 55, made the shaft-orientations dimension small, and has avoided change gear axial length's increase.

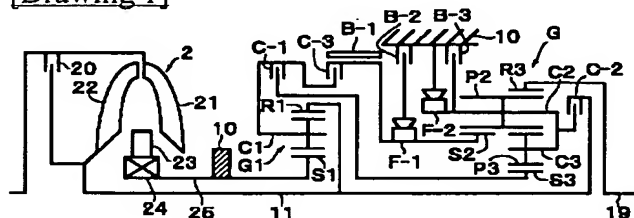
[0096] as mentioned above, although the operation gestalt of a large number which have this invention assumed was mentioned and explained in full detail, each of each [these] operation gestalten is the things for instantiation, can look this invention like [each claim of a claim] variously within the limits of the matter of a publication, and can change and carry out a concrete configuration.

[Translation done.]

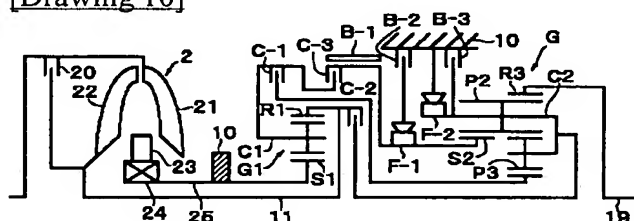
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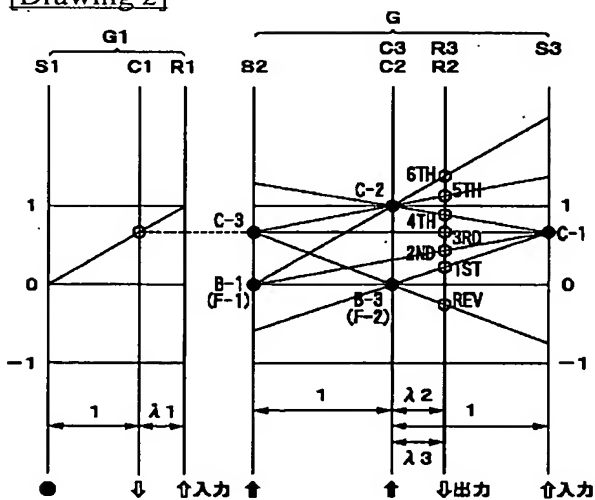
[Drawing 1]



[Drawing 10]



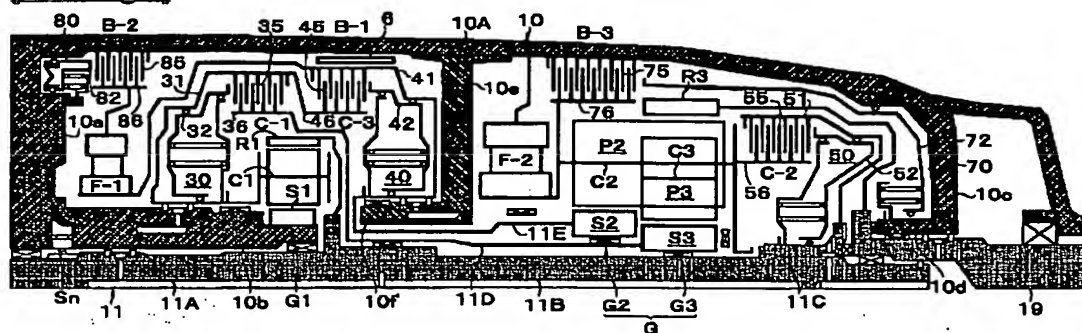
[Drawing 2]



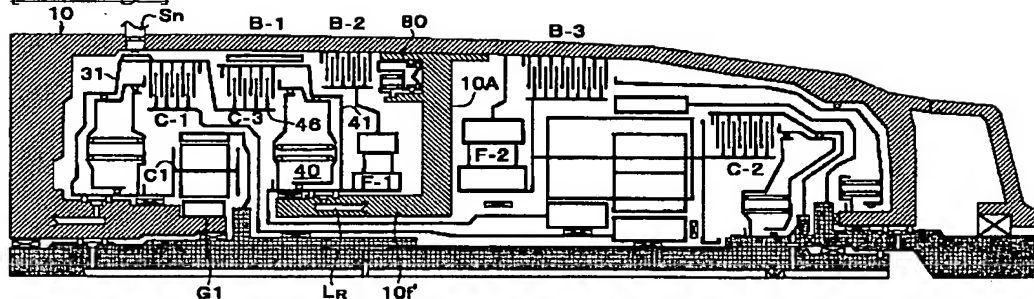
[Drawing 3]

	C-1	C-2	C-3	B-1	B-2	B-3	F-1	F-2	ギヤ比	ステップ
P										
REV			○			○			3.394	
N										
1ST	○					△		○	4.148	1.75
2ND	○			△	○		○		2.370	1.52
3RD	○		○		●				1.558	1.35
4TH	○	○			●				1.155	1.34
5TH		○	○		●				0.858	1.25
6TH		○		○	●				0.688	

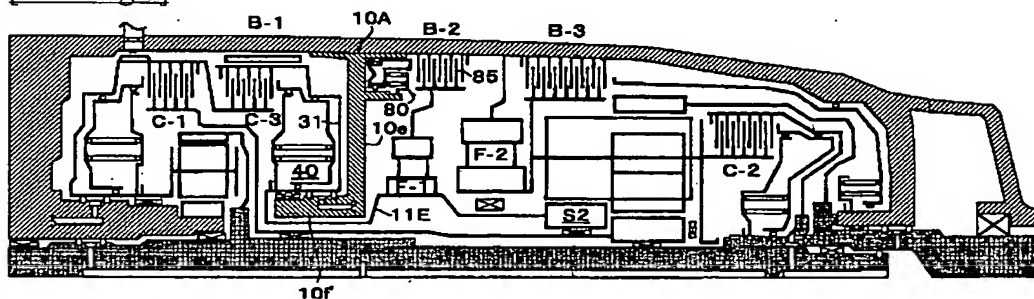
[Drawing 4]



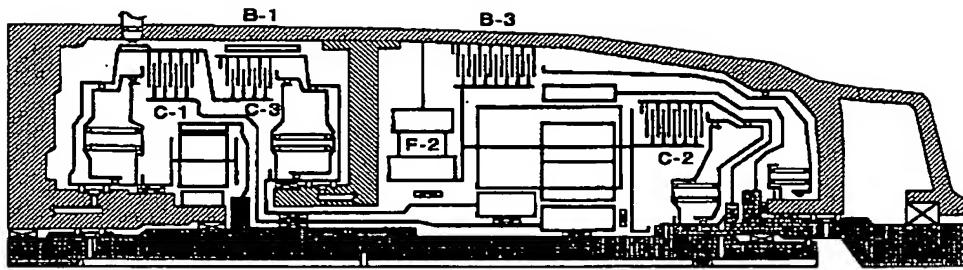
[Drawing 5]



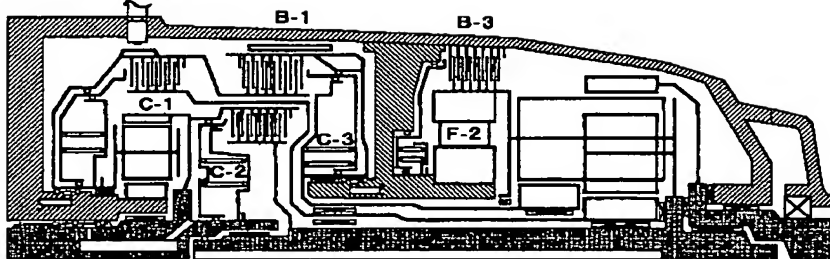
[Drawing 6]



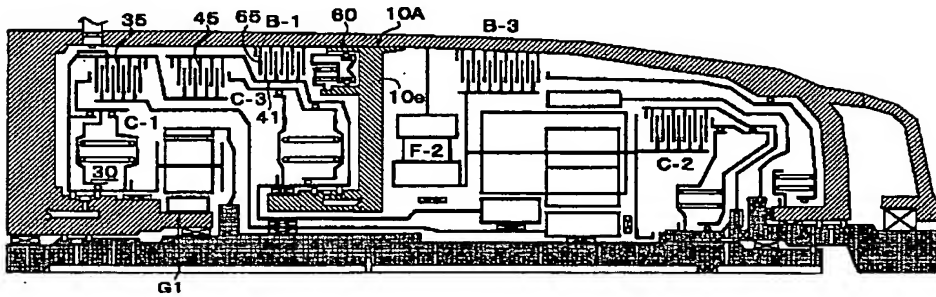
[Drawing 7]



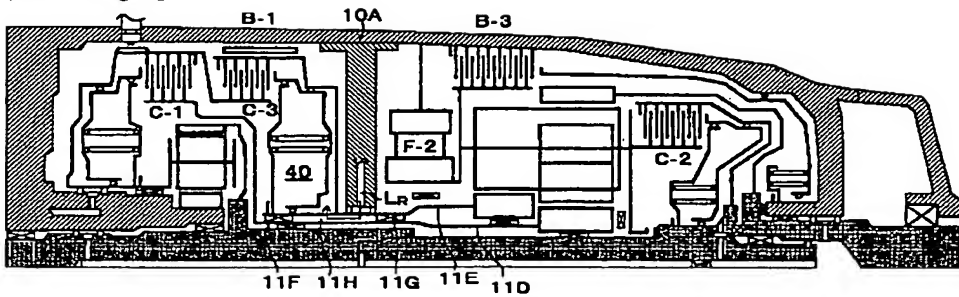
[Drawing 13]



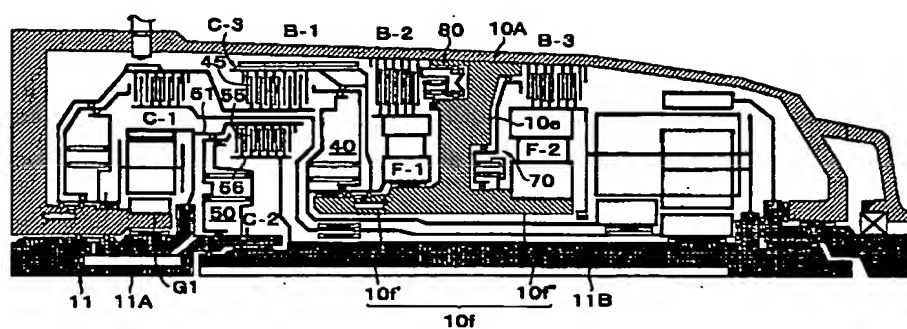
[Drawing 8]



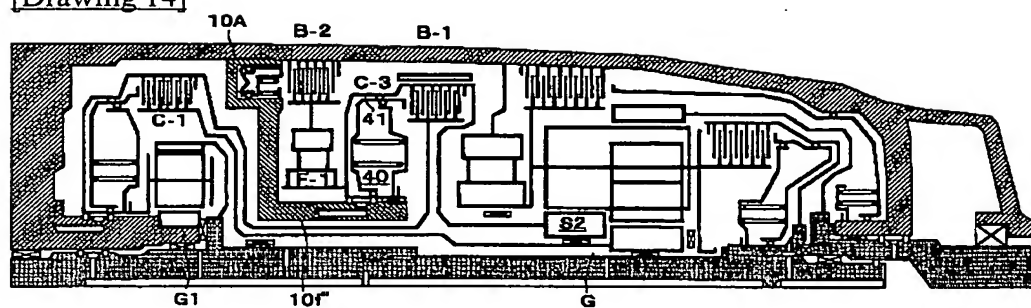
[Drawing 9]



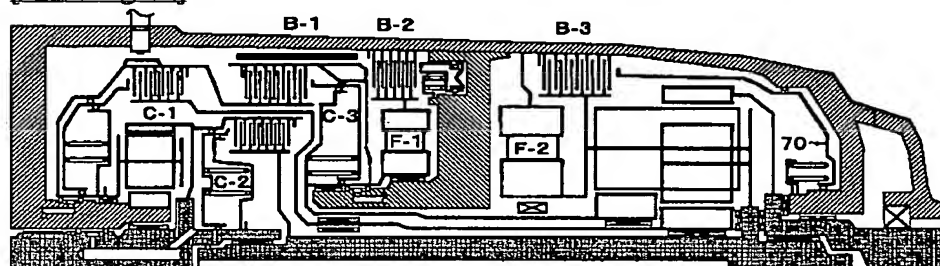
[Drawing 11]



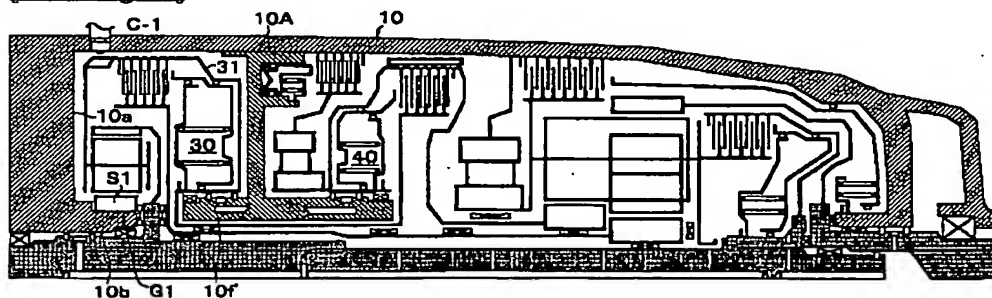
[Drawing 14]



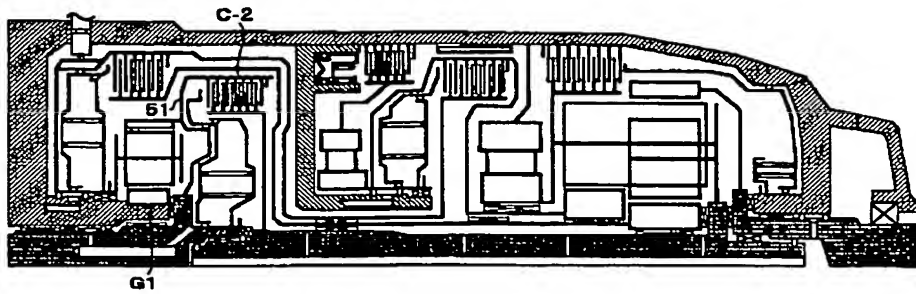
[Drawing 12]



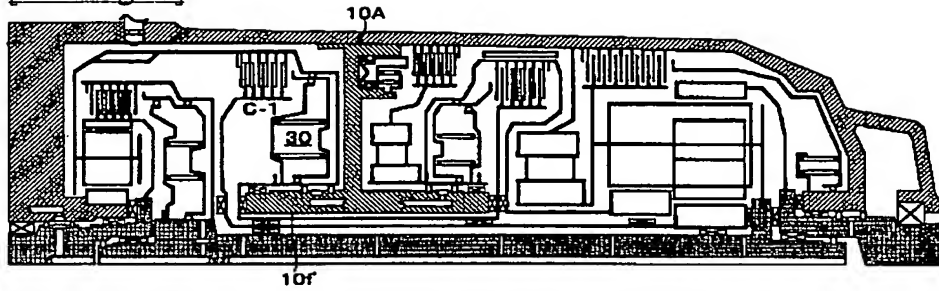
[Drawing 15]



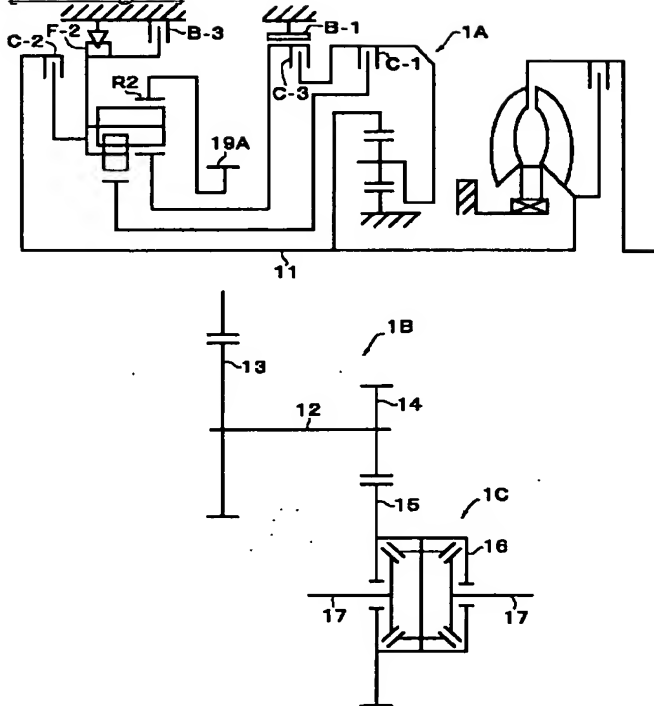
[Drawing 16]



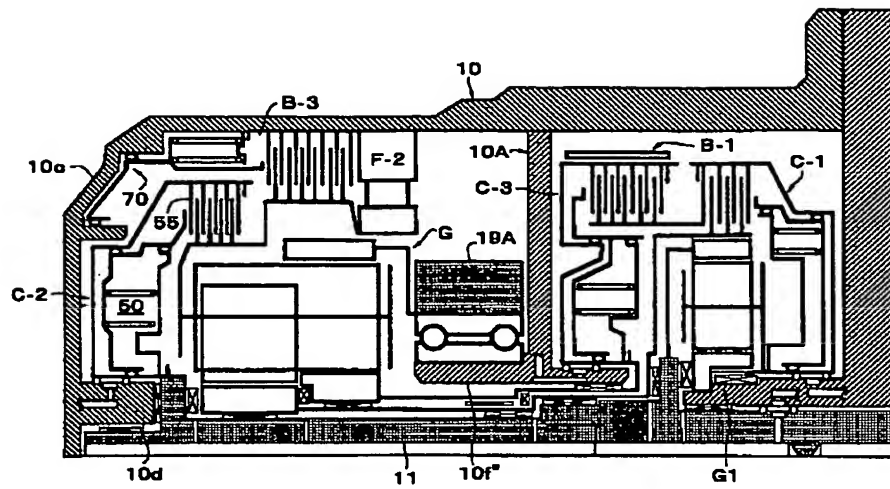
[Drawing 17]



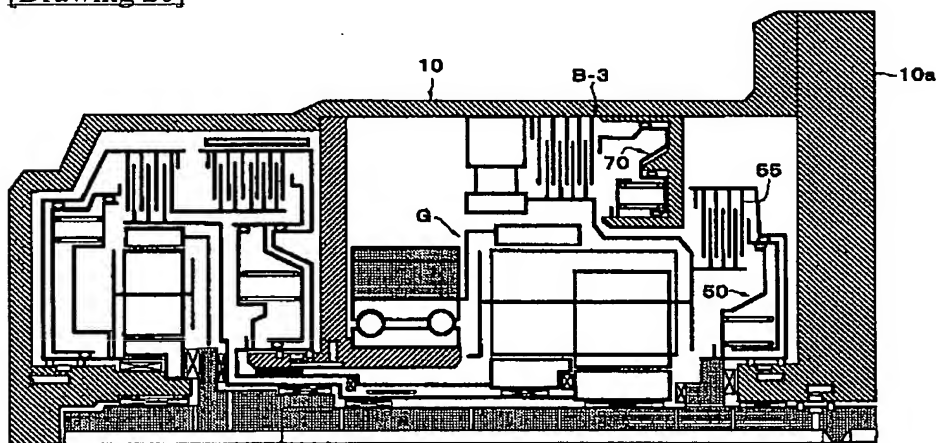
[Drawing 18]



[Drawing 19]



[Drawing 20]



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